

What is claimed is:

1. A system, comprising:
means for creating a learning map, which expresses learning target dependencies; and
means for assessing whether the learning target dependencies expressed by the learning map are accurate.
2. The system of claim 1, further comprising means for modifying the learning map, wherein the modifying means comprises means for modifying the learning map in response to the assessing means determining that one or more learning target dependencies expressed by the learning map are not accurate.
3. The system of claim 1, wherein the assessing means includes means for determining whether the learning map includes two or more learning targets that represent the same or essentially the same targeted concept.
4. The system of claim 3, further comprising means for modifying the learning map, wherein the modifying means is configured to modify the learning map in response to the assessing means determining that two or more learning targets included in the learning map represent the same or essentially the same targeted concept.
5. The system of claim 4, wherein, in response to the assessing means determining that two or more learning targets

included in the learning map represent the same or essentially the same learning target, the modifying means is configured to combine the two or more learning targets into a single learning target.

6. The system of claim 1, wherein the assessing means includes means for determining whether the learning map includes a learning target that represents more than one targeted concept.

7. The system of claim 6, further comprising means for modifying the learning map, wherein the modifying means is configured to modify the learning map in response to the assessing means determining that a learning target represents more than one targeted concept.

8. The system of claim 7, wherein, in response to the assessing means determining that the learning map includes a learning target that represents more than one targeted concept, the modifying means is configured to split the learning target into at least two learning targets.

9. The system of claim 1, wherein the means for assessing whether the learning target dependencies expressed by the learning map are accurate includes means for assessing whether the learning target dependencies expressed by the learning map are accurate with respect to a first subset of students and means for assessing whether the learning target dependencies expressed by the learning map are accurate with

respect to a second subset of students.

10. The system of claim 1, wherein the means for assessing includes means for determining whether the learning map includes a relationship between a first learning target and a second learning target that is inconsistent with information collected from one or more assessments.

11. The system of claim 10, further comprising means for modifying the learning map in response to the assessing means determining that the learning map includes a relationship between a first learning target and a second learning target that is inconsistent with information collected from one or more assessments.

12. A student evaluation system comprising,
means for recording or accessing a student's response to at least one item of an assessment; and
means for determining a probability that the student knows a selected learning target in a learning map, wherein the determining means makes the determination using, at the least, a response from the student to an item that targets the selected learning target and a probability value associated with the response and the selected learning target.

13. The student evaluation system of claim 12, further comprising means for creating an individual student map for a student.

14. The student evaluation system of claim 13, wherein the individual student map comprises a plurality of learning targets.

15. The student evaluation system of claim 14, further comprising means for determining the student's knowledge state with respect to each of said plurality of learning targets.

16. The student evaluation system of claim 15, wherein each of said learning targets has a color, and the color of a learning target is a function of the student's knowledge state with respect to the learning target.

17. A method for creating a learning map, comprising:
specifying a set of learning targets;
specifying learning target dependency relationships for the specified learning targets;
creating or updating a conditional probability table based on said specified set of learning targets and said specified learning target dependency relationships; and
displaying an acyclic directed network corresponding to the conditional probability table, wherein the acyclic directed network comprises a node for each specified learning target and one or more arcs for illustrating specified learning target dependency relationships.

18. A method for creating a learning map, comprising:
specifying a set of learning targets;
for each specified learning target, specifying the

learning targets that are precursors or postcursors of the learning target, thereby specifying precursor/postcursor learning target pairs;

for each precursor/postcursor learning target pair, specifying a postcursor inference value and a precursor inference value;

displaying an acyclic directed network that represents the precursor/postcursor relationships among the learning targets, wherein the acyclic directed network comprises a node for each specified learning target and one or more arcs for illustrating specified learning target precursor/postcursor relationships.

19. The method of claim 18, wherein, prior to specifying a postcursor inference value and a precursor inference value for a precursor/postcursor learning target pair, the method comprises the step of determining the postcursor inference value and the precursor inference value.

20. The method of claim 19, wherein the step of determining the postcursor inference value for the precursor/postcursor learning target pair comprises the steps of:

(A) assessing a set of students to determine the knowledge state of each student in the set with respect to the learning targets that form the precursor/postcursor learning target pair;

(B) determining the number of students in the set who have demonstrated that they know the postcursor learning target;

(C) determining the number of students in the set who have demonstrated that they know both the postcursor learning target and the precursor learning target; and

(D) dividing the number determined in step (C) by the number determined in step (B).

21. The method of claim 19, wherein the step of determining the precursor inference value for the precursor/postcursor learning target pair comprises the steps of:

(A) assessing a set of students to determine the knowledge state of each student in the set with respect to the learning targets that form the precursor/postcursor learning target pair;

(B) determining the number of students in the set who have demonstrated that they do not know the precursor learning target;

(C) determining the number of students in the set who have demonstrated that they do not know both the postcursor learning target and the precursor learning target; and

(D) dividing the number determined in step (C) by the number determined in step (B).

22. A method for determining a postcursor inference value for a precursor/postcursor learning target pair, comprising:

(A) assessing a set of students to determine the knowledge state of each student in the set with respect to the learning targets that form the precursor/postcursor learning target pair;

(B) determining the number of students in the set who have demonstrated that they know the postcursor learning target;

(C) determining the number of students in the set who have demonstrated that they know both the postcursor learning target and the precursor learning target; and

(D) dividing the number determined in step (C) by the number determined in step (B).

23. A method for determining a precursor inference value for a precursor/postcursor learning target pair, comprising:

(A) assessing a set of students to determine the knowledge state of each student in the set with respect to the learning targets that form the precursor/postcursor learning target pair;

(B) determining the number of students in the set who have demonstrated that they do not know the precursor learning target;

(C) determining the number of students in the set who have demonstrated that they do not know both the postcursor learning target and the precursor learning target; and

(D) dividing the number determined in step (C) by the number determined in step (B).

24. A student evaluation method, comprising:

administering an assessment to a student, wherein the assessment comprises a plurality of items;

recording or accessing the student's response to at least one item in the assessment;

selecting a first learning target from a learning map;

determining, for the first learning target, a set of values, wherein the values are based on the student's responses to the items and predetermined response effect values; and

determining a probability value that represents the probability that the student knows the first learning target, wherein the determined probability value is a function of, at the least, said set of determined values.

25. The method of claim 24, further comprising the step determining the postcursors of the first learning target.

26. The method of claim 25, further comprising the step of, for each postcursor, determining the probability that the student knows the postcursor.

27. The method of claim 26, further comprising the step of determining whether the student's demonstrated knowledge state of the postcursors indicates that the student's actual probability of knowing the learning target is greater than the determined probability value.

28. The method of claim 27, further comprising the step of increasing the probability value if the student's demonstrated knowledge state of the postcursors indicates that the student's actual probability of knowing the learning target is greater than the determined probability value.

29. The method of claim 24, further comprising the step

determining the precursors of the first learning target.

30. The method of claim 29, further comprising the step of, for each precursor, determining the probability that the student knows the precursor.

31. The method of claim 30, further comprising the step of determining whether the student's demonstrated knowledge state of the precursors indicates that the student's actual probability of knowing the learning target is less than the determined probability value.

32. The method of claim 31, further comprising the step of decreasing the probability value if the student's demonstrated knowledge state of the precursors indicates that the student's actual probability of knowing the learning target is less than the determined probability value.

33. A student evaluation method, comprising:
at a first point in time, assessing a student's knowledge state with respect to at least one learning target;
determining a first probability value based on data collected during the assessing step, wherein the first probability value represents a probability that the student has mastered the at least one learning target;
at a second point in time, assessing the student's knowledge state with respect to the at least one learning target;
determining a second probability value based on data

collected during the second assessing step, wherein the second probability value represents a probability that the student has mastered the at least one learning target;

determining the amount of time that has elapsed between the first point in time and the second point in time;

determining whether the student knew the at least one learning target at the first point in time but forgot it by the second point in time, wherein said determination is based, at least in part, on the determined amount of time that has elapsed, the first probability value, and the second probability value.

34. The student evaluation method of claim 33, further comprising the step of, at the first point in time, assessing the student's knowledge state with respect to a postcursor of the learning target.

35. The student evaluation method of claim 34, wherein said determination is based, at least in part, on the determined amount of time that has elapsed, the first probability value, the student's knowledge state of the postcursor at the first point in time, and the second probability value.

36. The student evaluation method of claim 33, further comprising the step of, at the second point in time, assessing the student's knowledge state with respect to a precursor of the learning target.

37. The student evaluation method of claim 36, wherein said determination is based, at least in part, on the determined amount of time that has elapsed, the first probability value, the student's knowledge state of the precursor at the second point in time, and the second probability value.

38. A method, comprising:
creating a first learning map in a given subject area for a first group of students,
creating a second learning map in the given subject area for a second group of students,
verifying the accuracy of the first learning map by using data associated with only students who are members of the first group,
verifying the accuracy of the second learning map by using data associated with only students who are members of the second group,
using the first learning map to evaluate the knowledge state of a student in the first group; and using
the second learning map to evaluate the knowledge state of a student in the second group.

39. A method for creating learning maps that target specific subsets of students, comprising:
creating a first learning map;
verifying the accuracy of the first learning map with respect to a first group of students;
if the learning map is not accurate with respect to the

first group of students, creating a second learning map by modifying the first learning map, wherein the second learning map is accurate with respect to the first group of students;

verifying the accuracy of the first learning map with respect to a second group of students; and

if the learning map is not accurate with respect to the second group of students, creating a third learning map by modifying the first learning map, wherein the third learning map is accurate with respect to the second group of students.

40. The method of claim 39, further comprising the step of using the second learning map to evaluate the knowledge state of a student in the first group.

41. The method of claim 40, further comprising the step of using the third learning map to evaluate the knowledge state of a student in the second group.